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HEATHER L. ROSENTRATER

REPRESENTING AVISTA CORPORATION



Avista Utilities
Natural Gas Infrastructure Plan
2020



TABLE OF CONTENTS

Executive Summary.....	1
Introduction	3
Avista’s Natural Gas Capital Investments	4
Classification of Infrastructure Need by Investment Drivers	4
Currently Planned Capital Investments in Natural Gas	6
Customer Requested	6
Mandatory & Compliance.....	7
Failed Plant & Operations	12
Asset Condition	13
Performance & Capacity	15
Avista’s Natural Gas O & M Investments.....	16
Wrap Up.....	16
Appendix A: Natural Gas for Generation	16
Appendix B: Jackson Prairie Storage Facility.....	16

TABLE OF FIGURES

<i>Figure 1. Avista Natural Gas Hookups.....</i>	<i>3</i>
<i>Figure 2. Avista Total Historic Actual Capital Spending by Investment Driver.....</i>	<i>4</i>
<i>Figure 3. Avista Projected Total Budget Gas Capital Expenditures by Investment Driver.....</i>	<i>4</i>
<i>Figure 4. Avista Gas Capital Budget by Investment Driver.....</i>	<i>6</i>
<i>Figure 5. Avista Gas Capital Expenditures Based on Customer Requests & Growth</i>	<i>6</i>
<i>Figure 6. Avista Gas Capital Expenditures Based on Mandatory & Compliance.....</i>	<i>7</i>
<i>Figure 7. Capital Expenditures Based on Failed Plant & Operations</i>	<i>12</i>
<i>Figure 8. Avista Gas Capital Expenditures Based on Asset Condition.....</i>	<i>13</i>
<i>Figure 9. Capital Expenditures Based on Performance & Capacity</i>	<i>15</i>
<i>Figure 10. Historical Avista Gas Actual O&M Expenses 2009-2019</i>	<i>16</i>

TABLE OF TABLES

<i>Table 1. Avista Gas Planned Capital Expenditures by Driver.....</i>	<i>6</i>
<i>Table 2. Avista Gas Customer Requested / Growth Capital Expenditures.....</i>	<i>7</i>
<i>Table 3. Avista Gas Mandatory & Compliance Capital Expenditures.....</i>	<i>8</i>
<i>Table 4. Avista Natural Gas Failed Plant & Operations Capital Expenditures.....</i>	<i>13</i>
<i>Table 5. Avista Natural Gas Asset Condition Capital Expenditures</i>	<i>14</i>
<i>Table 6. Avista Natural Gas Performance & Capacity Capital Expenditures.....</i>	<i>16</i>

EXECUTIVE SUMMARY

The Natural Gas group is facing a lot of changes in the next few years, many related to processes and requirements, and many outside of the Company's control. All of these changes will create direct budget impacts.

This sector faces heavy scrutiny across a wide spectrum of environmental issues including air and water quality and greenhouse gas emissions from the Environmental Protection Agency, the Federal Energy Regulatory Commission, state agencies, state legislatures, and the public at large.

Safety and operations regulations are also evolving at the state and federal level. The United States Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) establishes national policy, sets and enforces standards, educates, and conducts research to prevent incidents. Currently there are discussions underway at both the PHMSA and at the Washington Utilities and Transportation Commission to clarify the definition of transmission versus distribution level pipelines. Today transmission high pressure supply lines are designated as those operating above 20% yield strength.¹ Under this definition, Avista has 76 miles of transmission pipe (the Kettle Falls system) and 270 miles of high pressure distribution (supply) pipe in Washington. If this classification is changed, all 346 miles of the Company's natural gas pipeline would have to be operated as transmission. Transmission pipelines require a significantly higher level of maintenance, integrity management, and inspections to operate. Thus this change would impact Avista's Capital and O&M budgets and have a significant impact on technical and field resources as well. The Company is awaiting a decision on this issue.

As another example, Avista is required to relocate facilities to accommodate state, county and municipal infrastructure projects, often transportation related, and which must be done at the Company's expense. The schedules for these moves are not always provided with enough notice to be included in Avista's budgets. In addition, there are increasing restoration requirements. In Oregon, for example, specialized fill is required for trenches, and the entire roadway must sometimes be resurfaced rather than restoring the asphalt directly over the trench itself as we do in most other districts. Extensive



Clearwater Paper Gas Service

¹ Yield strength is an indication of the minimum level of internal stress a pipeline can experience and maintain integrity. <https://sciencing.com/calculate-smys-5332072.html>

landscaping, new sidewalks, a large number of traffic control measures, and the like are becoming more commonplace when these requests are made, all of which hit Avista's Natural Gas budget, often unexpectedly, and without Avista's choice or control.

Adding additional complexity, the gas business has been particularly hard hit by workforce issues. The industry is experiencing challenges in attracting and retaining the experienced workforce needed for



gas construction work. As mentioned, this business requires very specialized skills. Over the past few years, lower gas prices led to the layoff of thousands of employees who have moved on to other industries.² Qualified workers are hard to come by across the industry. Avista and its contractors are facing this problem as well. Not only is it difficult to attract workers to this business, it is difficult to keep them, and the cost of doing so continues to rise. Increasing competency requirements and regulatory obligations are also causing workers to move to other types of construction activities where these requirements don't exist and the work is easier.

This report attempts to document the business investments that are known and why they are important to serving customers and providing safe, reliable natural gas service and infrastructure. It describes Avista's work to manage through these issues by developing Capital and O&M programs that meet customer and regulatory requirements while attempting to be as cost effective and efficient as possible. The primary focus is always safety, as there is nothing more important to the gas industry, and to Avista, than the safety of customers, employees, and the communities served.

For more information about Avista's natural gas business, the issues facing the natural gas industry, the Company's natural gas safety and public outreach programs, and a glossary of terms, please see the Avista's Natural Gas Infrastructure Plan 2019, available on the Company's internal website³ or by request.



² Since 2014 more than 440,000 jobs were lost in the oil and gas industry. Irina Slav, "Recovery? The Oil and Gas Industry is Hiring Again," USA Today, November 2, 2017, <https://www.usatoday.com/story/money/energy/2017/11/02/recovery-oil-and-gas-industry-hiring-again/819773001/>

³ Go to the Avenue, Tools and Resources tab, under "Avista Infrastructure Plans"

INTRODUCTION

Avista owns and operates nearly 8,000 miles of natural gas distribution mains serving about 350,000 customers across Washington, Idaho, and Oregon.⁴ The natural gas Avista purchases can be transported via six connected pipelines on which the Company holds first contractual transportation rights, with access to both U.S. and Canadian supplies.⁵ In 2019 the Company delivered about 345 million therms of retail natural gas and over 504 million therms of wholesale natural gas, generating revenues of approximately \$288 million dollars.⁶ Avista’s electric generation mix is also heavily dependent upon natural gas as a fuel. In a typical year, the Company’s electricity portfolio is comprised of about 49% hydro, 35% natural gas-fired, 9.5% coal, 4.5% wind, and 2% biomass generation.⁷ Natural gas is a significant part of Avista’s business on both the electric and the gas side, allowing us to serve customers energy needs in diverse and cost effective ways.

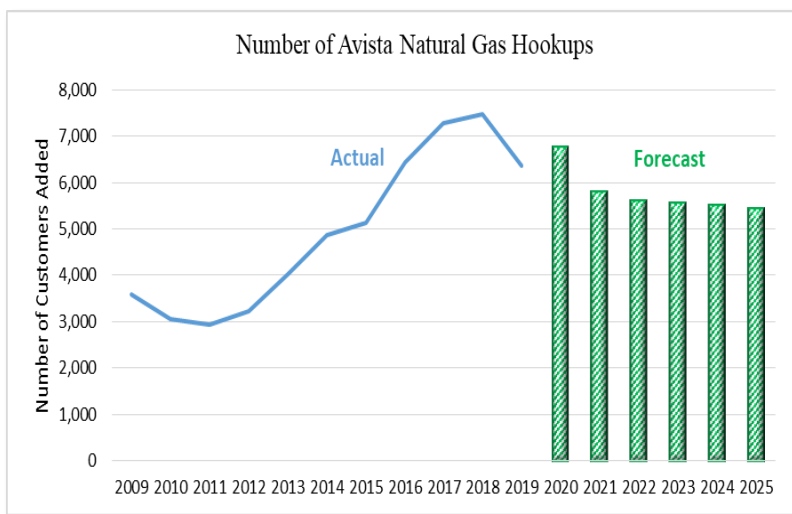


Figure 1. Avista Natural Gas Hookups

The Company has experienced steady growth in natural gas customers, though hookups were down in 2019 due to the expiration of the Washington Line Excess Allowance Program (LEAP). This program helped customers receive an allowance to help pay for connecting to Avista’s natural gas system. The forecast over this budgeting period indicates an average of approximately 5,800 hookups per year going forward.

⁴ 2019 Avista Quick Facts, <https://www.myavista.com/about-us/our-company/quick-facts>

⁵ Oregon Public Utility Commission UG-325, Direct Testimony of Scott L. Morris, page 3, <https://edocs.puc.state.or.us/efdocs/HTB/ug325htb154322.pdf>. Note that typically approximately 25% of the Company’s supply comes from the U.S. with the remaining 75% coming from Canadian sources.

⁶ From Avista’s 2019 Quick Facts. Note that electric revenues were approximately \$800 million during the same time period.

⁷ Avista 2017 Electric IRP (the most current as of this printing), <https://www.myavista.com/about-us/our-company/integrated-resource-planning>, select “Electric Integrated Resource Plan (PDF),” page 4-1. For more information about Avista’s natural gas generating resources, please see Appendix A.

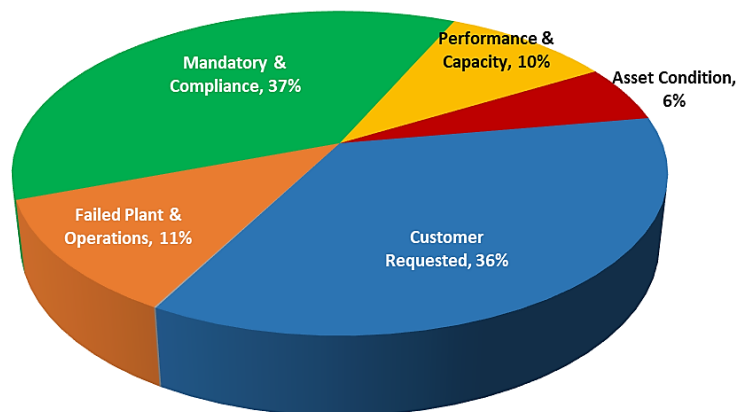
AVISTA'S NATURAL GAS CAPITAL INVESTMENTS

CLASSIFICATION OF INFRASTRUCTURE NEED BY INVESTMENT DRIVERS

As a way to create more clarity around the particular needs being addressed with each capital investment, as well as simplifying the organization and understanding of Avista’s capital spending, the Company has organized its capital infrastructure investments by the classification of need or “Investment Driver.” The need for investments associated with each investment driver is briefly defined below. Please note that all dollar figures shown in this report represent expenditures on a system wide basis.

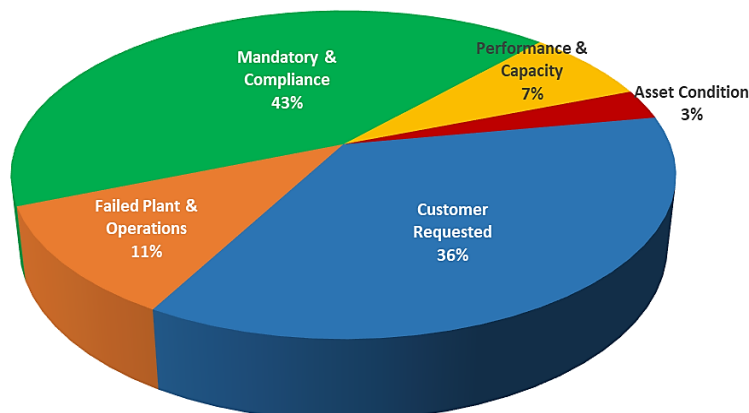
1. **Customer Requested** – This category is set aside primarily for connecting new customers or enhancing their service as requested. Typical projects include installing gas facilities in new housing or commercial developments or moving equipment at a customer’s request, for instance if they are building a deck or addition that conflicts with the current location of their gas meter.

2. **Mandatory & Compliance** – This is a driver related directly to compliance with laws, regulations and agreements, areas for which the Company has little or no discretion in spending. This category also applies to national safety codes and regulations. Projects in the Mandatory and Compliance category may include the obligation to relocate facilities based on road construction projects, environmental compliance, and replacement of pipeline protection systems based on national code requirements. Compliance expenditures are often related to safety. The Gas group’s laser focus on safety and compliance leads this to be a primary spending category.



Natural Gas Historical Spending by Investment Driver: 2009 - 2019

Figure 2. Avista Total Historic Actual Capital Spending by Investment Driver



Natural Gas Five Year Budget by Investment Driver: 2020-2024

Figure 3. Avista Projected Five Year Budget for Gas Capital Expenditures by Investment Driver

3. **Failed Plant & Operations** – This category of spending replaces failed equipment, typically related to storm damage or the unexpected failures of capital assets. In Gas, this funding is under a program called Non-Revenue, which tends to be reactionary (unplanned) work such as responding to leaks, damaged equipment, dig-ins, etc. The forecasted budget levels for this category are based on historical spend.



4. **Asset Condition** – This driver is focused on replacing assets at the end of their useful service life. Avista uses an analytical approach to asset replacement which includes asset criticality, inspections, and optimization of life cycle costs. Gas pipeline condition (and associated equipment) is directly related to customer and employee safety, so the equipment is carefully monitored and replaced as necessary. Laws and regulations are also a factor. For example, regulator stations are required by the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) to be kept in very specific condition.⁸ Federal Code also requires that Avista maintain an active program related to asset condition, including evaluating risk related to gas facilities and mitigating any such risks, such as unconventional or obsolete pipe, deteriorated pipe and associated equipment, or corrosion issues.

5. **Customer Service Quality & Reliability** – This category of spending helps Avista meet customers' expectations for quality of service and reliability. Programs in this category include the Washington and Idaho advanced meter infrastructure (AMI) in the Distribution business unit budget or customer facing technology programs implemented by Enterprise Technology. There are no specific funds set aside in the gas business unit for this category in the current budget cycle.

6. **Performance & Capacity** – This driver helps ensure that assets satisfy business needs and meet performance and reliability standards. In the gas business, many of the projects in this category are related to reinforcing gas service as customer loads grow and change. The goal of these programs is to ensure that customers have an adequate supply of natural gas to keep them warm on the coldest days through effectively managing the gas delivery system. This category also includes technology that allows monitoring and controlling the system more proficiently for safety and reliability.



⁸ DOT Code of Federal Regulations Title 49 Transportation 192.739, <https://www.gpo.gov/fdsys/pkg/CFR-2017-title49-vol3/xml/CFR-2017-title49-vol3-sec192-739.xml>

CURRENTLY PLANNED CAPITAL INVESTMENTS IN NATURAL GAS 2020 – 2024

For the next five-year planning horizon, Avista expects to spend nearly \$385 million in capital dollars for the Natural Gas business, allocated across five of the six investment drivers described above. Avista’s programs for gas infrastructure investments are summarized by investment driver below.

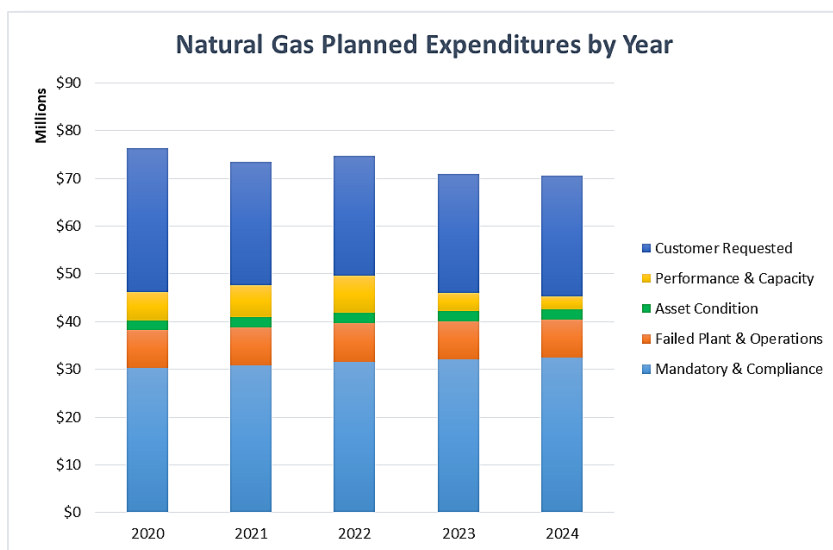


Figure 4. Avista Gas Capital Budget by Investment Driver

Business Driver	2020	2021	2022	2023	2024	5 Year Total
Customer Requested	\$30,123,307	\$25,855,402	\$25,177,121	\$25,009,773	\$25,260,975	\$131,426,578
Mandatory & Compliance	\$30,233,892	\$30,758,892	\$31,639,816	\$32,068,645	\$32,425,648	\$157,126,893
Failed Plant & Operations	\$8,000,000	\$8,000,000	\$8,000,000	\$8,000,000	\$8,000,000	\$40,000,000
Asset Condition	\$2,000,000	\$2,200,000	\$2,210,000	\$2,220,000	\$2,230,000	\$10,860,000
Performance & Capacity	\$5,960,000	\$6,650,000	\$7,700,000	\$3,700,000	\$2,700,000	\$26,710,000
Total	\$76,317,199	\$73,464,294	\$74,726,937	\$70,998,418	\$70,616,623	\$366,123,471

Table 1. Avista Natural Gas Planned Capital Expenditures by Driver

Customer Requested

Growth often refers to new service connections, as in growth in the number of customers, however, these investments are primarily beyond the control of the Company, and as such they do not reflect a plan or strategy on the part of Avista. Responding quickly to customer requests is a requirement of providing utility service. This kind of work may include hooking up

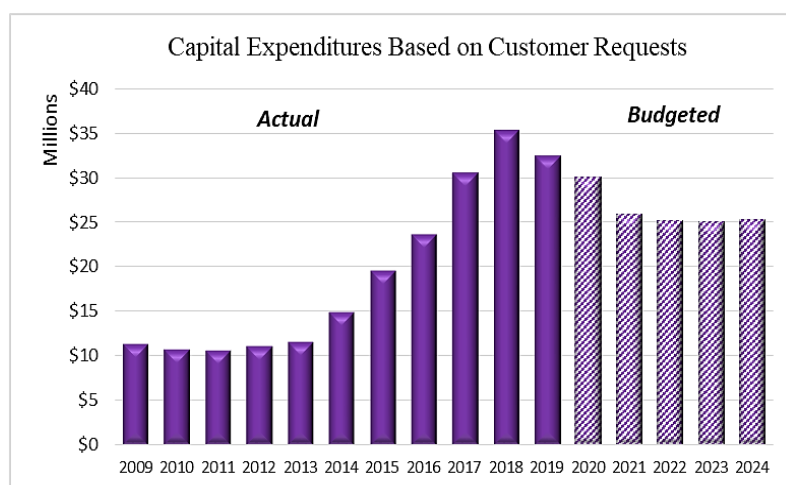


Figure 5. Avista Gas Capital Expenditures Based on Customer Requests & Growth⁹

⁹ In 2018 these expenditures jumped due to the Company’s Advanced Metering Infrastructure (AMI) gas meter installations in Washington.

new customers or adding meters, regulators, and/or electronic transmitting devices to read meters. The Gas Revenue classification specifically covers the addition of new customers.

Customer Requested	2020	2021	2022	2023	2024
Gas ERT Minor Blanket	\$863,119	\$812,907	\$829,275	\$851,543	\$874,735
Gas Meters Minor Blanket	\$1,224,583	\$1,078,078	\$1,091,969	\$1,118,911	\$1,147,112
Gas Regulators Minor Blanket	\$483,208	\$450,535	\$450,184	\$454,826	\$459,891
Gas Revenue	\$27,552,397	\$23,513,882	\$22,805,693	\$22,584,493	\$22,779,238
Total	\$30,123,307	\$25,855,402	\$25,177,121	\$25,009,773	\$25,260,976

Table 2. Avista Natural Gas Customer Requested / Growth Capital Expenditures

Mandatory & Compliance

Avista operates within a complex regulatory and business framework and must adhere to state and federal laws, agency rules and regulations, and county, city, and municipal ordinances. Compliance with these rules, as well as contracts and settlement agreements, represent obligations that are generally required by others and largely outside of Avista’s control. The types of gas investments that fall into this driver include the obligation to relocate facilities to

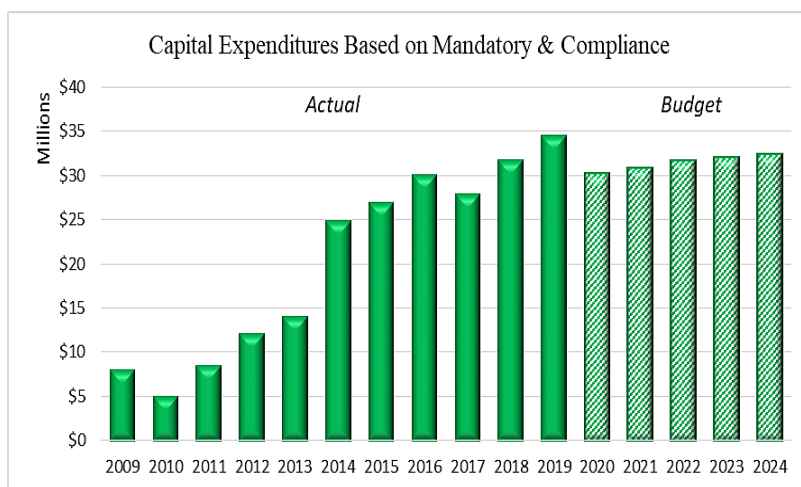


Figure 6. Avista Gas Capital Expenditures Based on Mandatory & Compliance

accommodate state, county and municipal infrastructure projects (frequently transportation related) and compliance with pipeline safety and environmental regulations. Regulations are increasing and becoming progressively more expensive to implement,¹⁰ as indicated by the increasing budget for this category.



In the natural gas business, the PHMSA requires pipeline operators to identify and document as well as have adequate cathodic protection in place for pipelines to protect against corrosion. Pipeline operators are also required to identify and mitigate the highest risk areas of their natural gas distribution systems¹¹ and to remove any customer-

¹⁰ The jurisdictions in which Avista must perform the work are becoming increasingly demanding in their requirements, including calling for additional work as a condition of construction, requiring excessive and extensive re-paving and/or landscaping, and even hiring additional flaggers, all of which increase costs in both capital and O&M budgets.

¹¹ For Avista, a high risk is the bending stress that occurs on Aldyl-A service pipe where it connects to a steel main pipe.

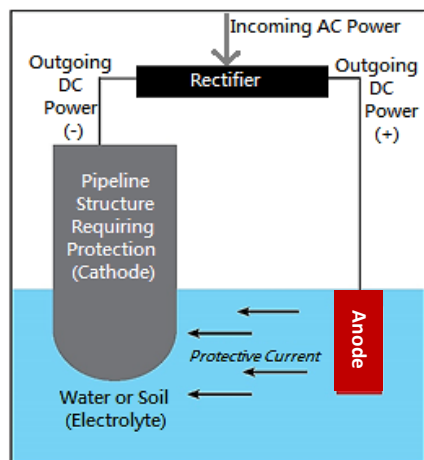
installed encroachments over pipelines. In addition, the Gas group must test meters to make sure they are performing correctly and replace them if they do not. Another capital cost results from local authority requests to relocate equipment residing on public easements, which must be done at the Company’s expense. Note that a primary driver for gas related mandatory and compliance expenditures is safety, as indicated by the projects below.

Mandatory & Compliance	2020	2021	2022	2023	2024
Cathodic Protection Program	\$715,000	\$715,000	\$715,000	\$700,000	\$700,000
Gas Facility Replacement Program (GFRP) Aldyl-A Pipe Replacement	\$23,318,892	\$24,043,892	\$24,624,816	\$25,218,645	\$25,825,648
Isolated Steel Replacement Program	\$1,400,000	\$1,400,000	\$1,600,000	\$1,600,000	\$1,600,000
Overbuilt Pipe Replacement Program	\$400,000	\$400,000	\$400,000	\$250,000	\$0
Planned Meter Change Out Program	\$1,400,000	\$1,200,000	\$1,300,000	\$1,300,000	\$1,300,000
Replacement Street and Highway Program	\$3,000,000	\$3,000,000	\$3,000,000	\$3,000,000	\$3,000,000
Total	\$30,233,892	\$30,758,892	\$31,639,816	\$32,068,645	\$32,425,648

Table 3. Avista Natural Gas Mandatory & Compliance Capital Expenditures

Cathodic Protection Program

The purpose of the Cathodic Protection (CP) program is to protect Avista’s buried steel pipe from the effects of natural corrosion. Corrosion is the result of an electro-chemical reaction of a metal surface to



its environment (such as the air or water) which causes a loss of metal from the surface, reducing the integrity of the pipeline. This can be seen as rust. The mechanism of cathodic protection is to make the pipeline part of an electric circuit by energizing the pipe with direct current, often provided by a device called a rectifier. The rectifier transforms the voltage level from the alternating current that it receives from the incoming power line into direct current (DC) that is used to electrify the pipe. The DC current is connected via a cable to a “sacrificial” metal anode that is easier to corrode than the pipe itself. This forced electrochemical process directs the corrosion process to the sacrificial metal, which protects the pipeline itself from corroding. In most cases the

pipe also has a high-dielectric strength special coating in conjunction with the use of a CP system.

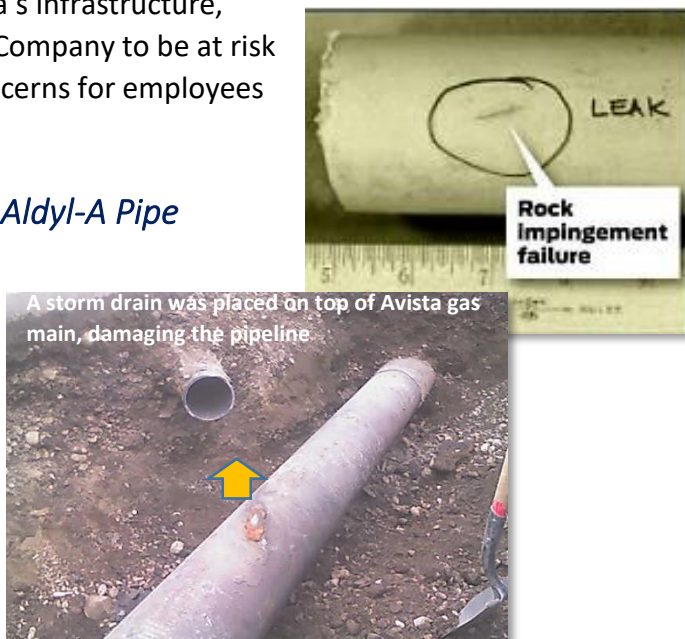
For this process to be effective, the circuit and power source must be properly maintained. The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration requires that gas pipelines installed after July of 1971 must have CP systems in place and that the performance must be closely monitored and tested at least



once a year. If a rectifier is used, it must be checked six times a year.¹² Failure of these systems is especially difficult to predict or determine because most of the pipelines are buried underground so deterioration is not immediately visible. Some of Avista's CP systems have already exceeded their useful life and thus have increasing risk of failure. These old systems must be replaced. Besides compromising the corrosive protection for Avista's infrastructure, these aged systems create the potential for the Company to be at risk of non-compliance as well as increase safety concerns for employees and the public.

Gas Facility Replacement Program (GFRP) Aldyl-A Pipe Replacement

The PHMSA requires pipeline operators to identify and mitigate the highest risks in their gas distribution systems. Over time the industry discovered that the certain resins used in Aldyl-A pipe may become brittle, causing leaking and failure.¹³ It is the Company's position that this issue creates unacceptable risk. Even above the mandatory requirements, this program is designed to protect public safety and property by proactively replacing all of this type of pipe existing within Avista's service territory.



The Gas Facility Replacement Program Aldyl-A Pipe Replacement replaces at-risk pipe sections over a 20 year time period starting with the highest risk areas. This work is done via a program endorsed by the Washington Utilities and Transportation Commission.¹⁴ The Company identified approximately 737 miles of priority Aldyl-A main pipe (1¼" through 4" in size) manufactured prior to 1985 and about 6,000 transition tees which need to be replaced. Transition tees connect the service lines to the main lines. The Company used a risk consequence model to try to predict where leaks are most likely to occur, then folded in information on customer density in these areas, specifically focusing on areas of congregation such as schools, hospitals, and apartment complexes.

The replacement program began in 2012 and is estimated to be completed within twenty years. It costs about \$69 to \$110 per foot depending upon conditions.¹⁵ For example, replacing pipeline under a roadway requires mitigation such as repaving the street and replacing associated infrastructure like

¹² U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration, Cathodic Protection Requirements, <https://primis.phmsa.dot.gov/comm/FactSheets/FSCathodicProtection.htm>

¹³ Aldyl-A pipe is a polyethylene pipe made by DuPont before 1984 and widely used throughout the gas industry. Over time it was discovered that this pipe can become brittle and prone to leaking, which can create safety risks.

¹⁴ WUTC UG-14089 https://www.utc.wa.gov/_layouts/15/CasesPublicWebsite/GetDocument.aspx?docID=256&year=2014&docketNumber=140189

¹⁵ Before the Washington Utilities and Transportation Commission, Testimony of Don Kopczynski, page 12, https://www.utc.wa.gov/_layouts/15/CasesPublicWebsite/GetDocument.aspx?docID=258&year=2014&docketNumber=14nk0189

trees and sidewalks, which is more expensive than work in a rural area. The Company makes every attempt to minimize the impact of this work on the public and public infrastructure.¹⁶

Isolated Steel Replacement Program

The program identifies and documents cathodically isolated steel pipe sections, including cathodically isolated steel risers,¹⁷ installed after July 31, 1971 with the goal of ensuring they are either adequately protected against corrosion or are replaced.¹⁸

Avista protects all of the buried steel pipes in the system from corrosion using cathodic protection with large, strategically placed anode beds. In order to protect the pipeline, this system relies on all of the steel pipe in a section to be continuously connected together (electrically) to form one big electrical circuit directly connected to the anode bed. Unfortunately some of these circuits of steel pipe have been broken up with plastic pipe as pipelines have been replaced over time. A section of steel pipe that is not directly connected (electrically) to the larger system is considered 'isolated.' The anodes cannot protect this pipe because they aren't electrically connected to it anymore, so it is no longer adequately protected from corrosion. Federal and state regulations require at least 10% of the Company's isolated steel sections of pipeline be inspected each year. If these sections are not cathodically protected and are thus at risk of corrosion, they must be replaced. With this program, the Company is replacing 10% of the isolated steel risers and short sections of isolated steel main within one year of their discovery. This work is stipulated in an agreement between Avista and the Washington Commission.¹⁹ Since the company has agreed this is prudent in the Washington jurisdiction, we have also extended this plan into our Idaho and Oregon jurisdictions.

Overbuilt Pipe Replacement Program

The Federal Code of Regulations²⁰ requires utilities to remove customer-installed encroachments or "overbuilds" that interfere with or prohibit the ability to safely operate the gas system. Typically an overbuild situation occurs when a structure is erected over the top of preexisting natural gas facilities. These structures or barriers prevent mandatory maintenance such as leak surveys, which



¹⁶ For a great summary of this program, see Michael B. Whitby and Dan Gigler, "Gas Facility Replacement Program," <https://www.utc.wa.gov/regulateIndustries/transportation/TransportationDocuments/Avista%20-%20Aldyl%20A%20Replacement%20Program.pdf>

¹⁷ Risers are the part of the pipe that transitions the pipe from underground to the surface and, in some cases, from plastic to steel.

¹⁸ 49 CFR 192.455 and 49 CFR 192.457 - External corrosion control for buried or submerged pipelines per United States Code.

<https://www.gpo.gov/fdsys/granule/CFR-2010-title49-vol3/CFR-2010-title49-vol3-sec192-455> and <https://www.gpo.gov/fdsys/pkg/CFR-2017-title49-vol3/pdf/CFR-2017-title49-vol3-sec192-457.pdf>

¹⁹ "Isolated Steel Settlement Agreement Report, Docket PG-100049,

https://www.utc.wa.gov/_layouts/15/CasesPublicWebsite/GetDocument.aspx?docID=66&year=2010&docketNumber=100049

²⁰ This part of the Federal Code of Regulations prescribes minimum safety requirements for pipeline facilities and the transportation of natural gas. US DOT 49 CFR, Part 192. <https://www.law.cornell.edu/cfr/text/49/part-192>

are typically performed by walking directly above the gas pipeline while operating the leak detection equipment. Overbuilds also increase the Company’s operating costs due to the need to return to the overbuild location multiple times to complete leak surveys and perform other maintenance tasks.



Buildings over a pipeline that are not properly vented also create the possibility of natural gas leaking and accumulating inside the structure, which creates additional safety hazards. Avista’s Overbuilt Pipe Replacement Program is designed to identify and remediate these kinds of issues. The work tends to be focused on overbuilds in mobile home parks. Due to the dynamic nature of these parks, they represent areas of high risk because the dwellings can be easily sited over buried facilities. Mobile homes are not the only structures built over pipelines. Sheds, patios, and more can cause problems. When these situations arise, the Company handles them on a case-by-case basis to protect the

interests of both Avista and other involved parties. This program funds the capital costs of relocating facilities to ensure adequate access to the pipeline and to preserve customer safety.

Planned Meter Change Out (PMC) Program

Accuracy in measuring customer usage is critical to both the customer and the Company. To ensure that meters are functioning correctly, Avista performs statistical meter sample testing based on



manufactured year, meter model and size. If analytics determine that a “meter family” is no longer taking precise measurements, the entire group of meters within that category are replaced. Conversely, if the analytics determine that the meters are testing well, the sample size for that group is reduced. This analytics-based methodology makes certain that problematic meters are

identified and replaced quickly while maximizing the efficiency and cost effectiveness of the sampling process.²¹

Replacement Street and Highway Program

Virtually all of Avista’s pipelines are located in public utility easements which are controlled by local jurisdictional franchise agreements. When local authorities request relocation, Avista is mandated to do so and usually at the Company’s expense. Unfortunately the expenditures in



Gas Line Relocated for Road Work

²¹ This program ensures that the Company is in compliance with Oregon’s OAC 860-023-0015 “Testing Gas and Electric Meters” Tariff Rule #18 <https://secure.sos.state.or.us/oard/viewSingleRule.action?ruleVrsnRsn=221169> and Idaho’s IDAPA 31.31.01.151 through .157 “Standards for Service” <https://adminrules.idaho.gov/rules/current/31/313101.pdf> and Washington’s WAC Chapter 480-90-333 through -348 “Gas companies – Operations” Tariff Rule #170 <http://apps.leg.wa.gov/wac/default.aspx?cite=480-90>

this category are difficult to predict. Most often the impacted utilities (natural gas, electric, phone, cable, etc.) are notified of projects requiring relocation in the spring after local budgets are developed. Avista typically utilizes historical expenditures to estimate what might be required in this spending category.

Failed Plant & Operations

Non-Revenue Program

This program covers assets that have failed and/or which must be exchanged in order to provide continuity and adequacy of service to customers. In addition to outage response, typical work may involve repair and replacement of facilities under a variety of circumstances such as dig-ins, damage repair or other unplanned work that comes up. This funding, called the Non-Revenue Program, has approximately \$8 million in funds set aside to cover this type of situation.

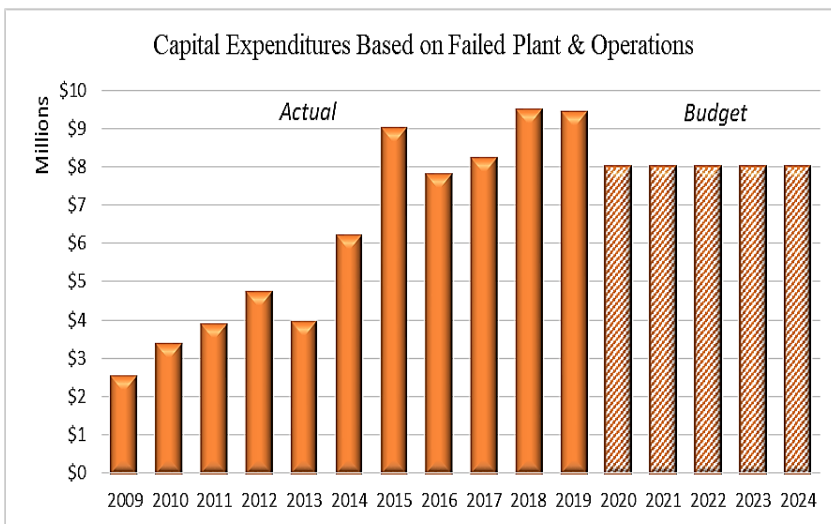


Figure 7. Capital Expenditures Based on Failed Plant & Operations

Funding for this type of work is very hard to predict, as it tends to be reactionary, such as relocations requested by customers (other than roadway relocations), leak repairs, pipeline that is found to be too shallow, or other such issues. If the work is large enough to warrant significant capital expenditures, it is prioritized and ranked against other Company capital projects, but smaller projects are funded through this program.

Note that if customers request relocation of gas facilities, Avista is bound by tariff language to do so at the customer’s expense. However, if the Company sees such a relocation as the chance to improve or



Gas Meter Barrier



update the gas system at the same time, the additional costs are charged to this category. Another common expenditure under this program is the reduction in the number of single-service taps off the supply main to serve a small group of customers versus a full distribution tap. By reducing the number of stations,

maintenance costs are lowered.²² Meter barricades also fall under this category. These are installed if vehicles may get too close to existing meters in order to protect them from damage.²³ This program essentially covers unforeseen work the Company performs to satisfy customers and maintain the safety, reliability and integrity of the system.

Failed Plant & Operations	2020	2021	2022	2023	2024
Non-Revenue Program	\$8,000,000	\$8,000,000	\$8,000,000	\$8,000,000	\$8,000,000

Table 4. Avista Natural Gas Failed Plant & Operations Capital Expenditures

Asset Condition

Assets of every type will degrade with age, usage, and other factors, and must be replaced or substantially rebuilt at some point in order to ensure the reliable and acceptable continuation of service as well as the safety of the public and Avista employees. The replacement of assets based on condition is essentially the practice of removing them from service and replacing them at the end of their useful life.

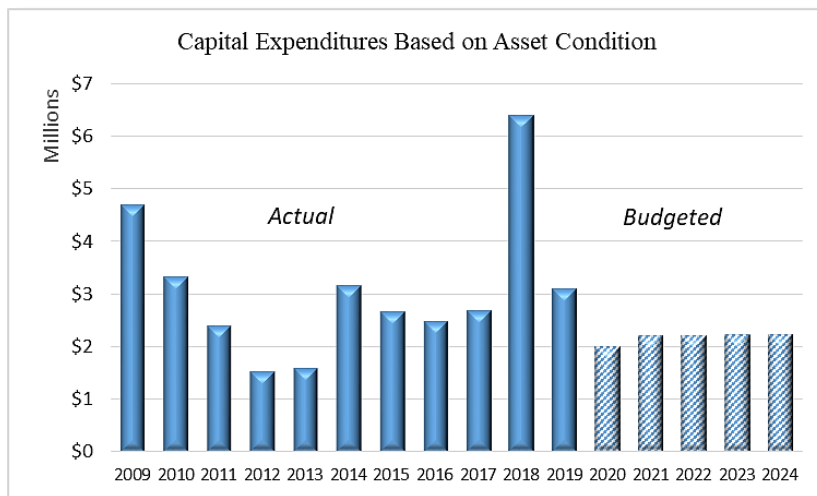


Figure 8. Avista Gas Capital Expenditures Based on Asset Condition²³

Across the utility industry and likewise for Avista, the replacement of assets based on condition constitutes a substantial portion of the infrastructure investments made each year.

At Avista, the goal is to manage assets in a manner that optimizes their overall value over the lifecycle of each particular asset class. Asset replacement strategies are “optimized” in the sense that a given approach may not achieve the overall lowest possible lifecycle cost, but rather the lowest cost that allows the Company to



meet a variety of important performance objectives, such as public safety or the efficient use of employee crews. Because failure of critical assets is unacceptable, they must be replaced before the end of their useful life even though they are still providing reliable service. In other instances it may be reasonable to



²² These small taps are called Single Service Farm Taps (SSFT), and many of Avista’s SSFTs are reaching the end of their service life at this time.

²³ These barricades are required by federal mandates and greatly improve the safety of the system.

²⁴ The large expenditures in 2018 are due to the installation of Advanced Metering Infrastructure (AMI) gas infrastructure in Washington.

wait until an asset fails before it is replaced, a strategy known as “run to failure.” The Natural Gas group programs in the Asset Condition driver category have the goal of replacing deteriorated steel pipe, meters, and regulators as described below.

Asset Condition	2020	2021	2022	2023	2024
Deteriorated Steel Pipe Replacement Program	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000
ERT Replacement Program	\$200,000	\$200,000	\$210,000	\$220,000	\$230,000
Regulator Station Replacement Program	\$800,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000
Total	\$2,000,000	\$2,200,000	\$2,210,000	\$2,220,000	\$2,230,000

Table 5. Avista Natural Gas Asset Condition Capital Expenditures

Deteriorated Steel Pipe Replacement Program

Multiple factors impact risk and the replacement of facilities including things like material failures, environmental impacts, increased leak frequency, unconventional/obsolete pipe sizes, no protective coating (bare steel) and/or problems with protective coating on pipe. This program is intended to address and remedy these issues. Pipe is regularly inspected across the service territory. When deteriorated pipe is identified, it is ranked by risk factor. The Company believes that replacing deteriorated pipe prior to failure in a planned manner will not only increase the safety of the system and customers but is also more cost effective than responding to unplanned emergency situations. The Deteriorated Steel Pipe Replacement Program is designed to specifically target and prioritize pipelines that may affect safety and system reliability. Avista believes that systematically replacing facilities on a planned basis reduces risk and increases the efficiency and effectiveness of expenditures over time.



Encoder Receiver Transmitter (ERT) Replacement Program

An ERT or Encoder Receiver Transmitter is a device that automatically records gas usage then sends the data to a remote data collector. These devices contain batteries. When these batteries fail, the customer’s usage is not sent to the collector and on to the Company, so it is estimated and entered

manually. Customers do not like to have their usage estimated due to the potential for billing errors and subsequent true-up bills. Billing estimates often result in a high number of customer complaints.



Itron's Natural Gas Encoder Receiver Transmitter Device

The Company currently has about 106,000 ERT units in Oregon, meaning there are a lot of batteries out there. The batteries are sealed inside the ERT for protection against weather and other environmental elements. It has been found to be more cost effective to replace the entire ERT rather than try to open them, replace the battery, and adequately reseal them. The average battery life is 16 years. The Company proposed a measured and levelized approach to this battery issue, developing a systematic replacement program of 7,000 ERTs per year beginning with the oldest units. This

program will be primarily focused in Oregon, as the replacement of the ERTs in Washington and Idaho will take place under the Advanced Metering Infrastructure (AMI) program.

Regulator Station Replacement Program

Regulator stations reduce and regulate the pressure in gas pipes. These stations and their associated equipment are critical to the successful operation of the gas system and must be replaced when they no longer meet standards or have reached the end of their service life. At times they are at an age where replacement equipment is no longer available. The maintenance and operation of these stations is regulated by the Federal Code of Regulations.²⁵ Avista's program is in full compliance with this Code and further is designed to improve system operating performance, enhance safety, replace inadequate or antiquated equipment that is no longer supported, and ensure the reliable operation of metering and regulating equipment. The goal of this program is to replace the highest priority projects every year, though new ones are being continually added.



Natural Gas Regulator Station

Performance & Capacity

Avista's projects and programs grouped in this category of need include a range of investments that address the capability of assets to meet defined performance standards, typically developed by the Company or based on a demonstrated need. Avista is also attentive to investment opportunities to

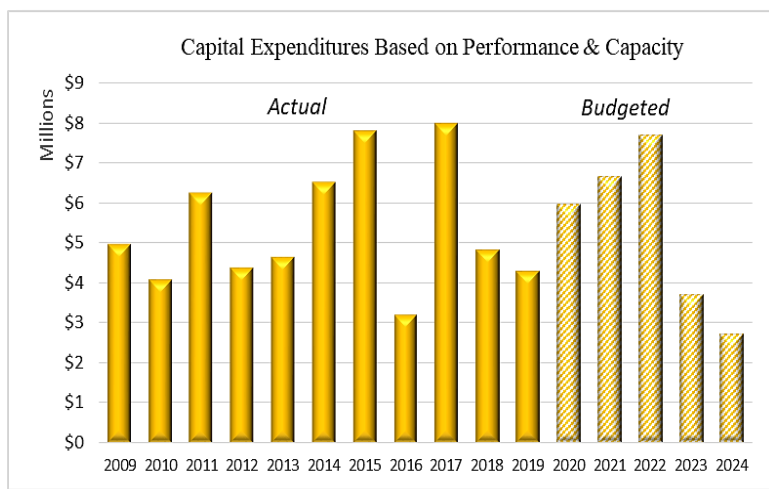


Figure 9. Capital Expenditures Based on Performance & Capacity²⁵

²⁵ 49 CFR 192.739 - Pressure limiting and regulating stations: Inspection and testing <https://www.law.cornell.edu/cfr/text/49/192.739>

²⁶ Note that the increase in 2021 is due to the high pressure reinforcement program in Warden, described in this report on page 18.

improve the performance of the gas distribution system when supported by a study or analysis that demonstrates the cost-effectiveness of the benefits achieved for customers.

Natural Gas has many projects related to Performance and Capacity, all of them are related to reinforcing the existing natural gas system due to load growth or age-required replacement. During this budget cycle, these types of reinforcements will likely occur in the Washington cities of Cheney, Airway Heights, Pullman, and Warden, and in the Sandpoint, Idaho area. This investment driver also funds the placement of monitoring equipment at gate and regulator stations to allow the Company to monitor what is happening in the gas system in real-time.



The Gas Planning department routinely runs load studies on Avista’s gas distribution system to identify areas of the system with insufficient capacity to serve existing firm customer loads based on “design conditions,” which refers to the projected system demand for a “coldest day on record” weather event. Avista attempts to ensure that the natural gas system is adequate to serve customer load in extreme weather conditions when customers need service the most. Identified deficient areas are given a priority level based on the severity of the risk associated with insufficient system capacity. Below is more information about the Natural Gas programs that fall into the Performance and Capacity category, most of them are related to upgrading the system to ensure that customers have adequate service.

Performance & Capacity	2020	2021	2022	2023	2024
Airway Heights HP Reinforcement Project	\$50,000	\$1,950,000	\$0	\$0	\$0
Cheney HP Reinforcement	\$4,710,000	\$3,100,000	\$0	\$0	\$0
Intermediate Pressure Reinforcement Program	\$1,000,000	\$1,300,000	\$1,500,000	\$1,000,000	\$1,000,000
Pullman HP Reinforcement Project	\$0	\$0	\$100,000	\$2,400,000	\$0
Schweitzer Mtn Rd HP Reinforcement	\$0	\$0	\$0	\$100,000	\$1,500,000
Telemetry Program	\$200,000	\$200,000	\$200,000	\$200,000	\$200,000
Warden HP Reinforcement	\$0	\$100,000	\$5,900,000	\$0	\$0
Total	\$5,960,000	\$6,650,000	\$7,700,000	\$3,700,000	\$2,700,000

Table 6. Avista Natural Gas Performance & Capacity Capital Expenditures

Airway Heights High Pressure (HP) Reinforcement Project

Airway Heights is the fastest growing area in Spokane County. The Company’s capacity there is no longer sufficient to serve customers, primarily for space heating, during severely cold winter weather. This reinforcement project will install a new loop of approximately 20,000 feet of high pressure gas main to serve this area and reinforce the existing system.

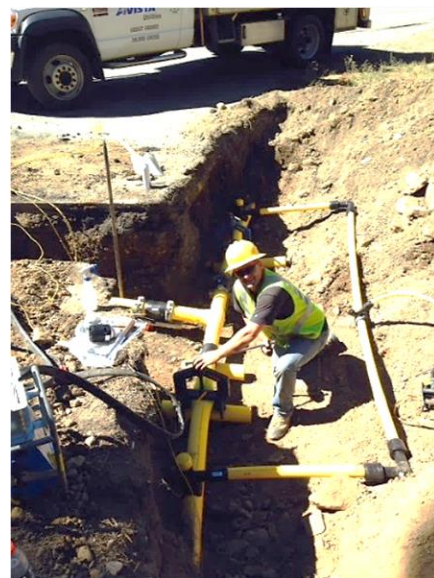


Cheney High Pressure (HP) Reinforcement Project

The existing pipeline system that serves the town of Cheney is no longer adequate to serve customer demands on cold weather days. There are a couple of additional circumstances with this pipeline that must be noted. It was built between 1957 and 1965 so was not designed to support the current population of this area. In addition, a large industrial customer on this pipeline has submitted plans to increase their gas requirements beyond what the current system can provide. The Cheney High Pressure Reinforcement Project program will address these multiple concerns with one effective solution.

Intermediate Pressure Reinforcement Program

There are continual changes in customer growth and load patterns throughout Avista's intermediate pressure (≤ 60 psig) pipeline system as, for example, new subdivisions are built or businesses open, close, or expand. The Company has an obligation to serve firm customers by providing adequate capacity every day, including the coldest days of the year. In order to do this, the service territory and associated gas system is constantly monitored to identify areas where new customers are being added or where load patterns have changed. The Gas Intermediate Pressure Reinforcement Program focuses on maintaining adequate gas system capacity by upsizing existing gas mains, looping supply lines to provide back-up service capability, and other reinforcements or upgrades that may be needed to provide dependable, reliable service to customers across the service territory. Projects are evaluated and sorted by priority to maximize the value of the funding in this program.



Pullman High Pressure (HP) Reinforcement Project

Load growth in the Pullman area has exceeded the capacity of the existing Pullman Gate Station.²⁷ The contracted capacity at this gate is 786,000 cubic feet per hour but the projected need for design condition is 916,000 cubic feet per hour, which puts approximately 1,300 customers at risk of losing gas service when temperatures plunge. This project proposes installing a gas main between the Moscow Gate Station and the Pullman Gate Station (approximately 3 miles of pipeline) to balance the loads, create a more reliable looped system,²⁸ to allow for projected area load growth, and to make sure that no customers are at risk of losing gas service on cold winter days.

²⁷ A gate station is the supply point into Avista's system. It takes high pressure gas from a larger pipeline, reduces the pressure, and moves it onto a distribution pipeline.

²⁸ A looped system means that customers can be served from more than one pipeline so if a pipeline has a failure or is out of service for maintenance, customers can be served from a different pipeline without experiencing an outage.

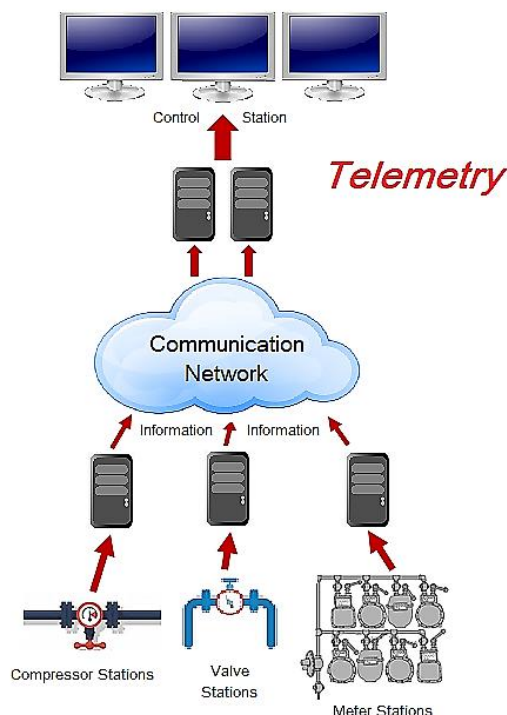
Schweitzer Mountain Road High Pressure (HP) Reinforcement

Load growth in the Sandpoint area has exceeded the capacity of the existing gas distribution system, and it gets very cold in Sandpoint, which causes additional strain to the gas system. Avista plans to reinforce this system by installing 1.3 miles of 6” steel gas main pipeline and an associated regulator station on Schweitzer Mountain Road to alleviate this constraint.



Warden High Pressure Reinforcement

Warden, Washington, currently has two concerns associated with capacity. The first is that the town is supplied with gas from the fully-subscribed and capacity-constrained Moses Lake Lateral²⁹ (owned by Williams NWP). Secondly the high pressure supply line coming into town has reached its capacity. As a result of current capacity/supply constraints, industrial gas growth opportunities are hampered within the Port of Warden Industrial Park as well as other sites in the area. Grant County Economic Development Council and the Port of Warden have contacted Avista several times related to different commercial ventures interested in the Port site and are pressing for additional natural gas supply for the area. Schedule and timing are critical aspects of this project. To address this supply problem, the Company plans to install a new gate station and approximately 3.2 miles of 6” high pressure distribution pipeline.



Telemetry Program

Gas telemetry is equipment that remotely monitors system pressures, volumes, and flows across the gas pipeline system. It allows the Company to see what is happening at gate and regulator stations, monitor large industrial customer usage rates and interconnection points. Avista attempts to replace this equipment at the end of its useful life or as it fails. Another goal is to keep the technology current, as this equipment is critical in identifying problem areas in the pipeline such as a lack of pressure to serve customers or other abnormal situations that must be corrected in order to provide safe, reliable service. The current funding level adds about five new telemetry sites and upgrades or replaces an additional 15 sites per year based on the Company’s experience and expectations.

²⁹ Lateral pipelines deliver natural gas to or from the mainline and are typically between 6 and 16 inches in diameter.

AVISTA'S NATURAL GAS O & M INVESTMENTS

Avista monitors the gas system very closely to guarantee that critical equipment remains functional and the system is fully intact. O&M expenditures allow the Company to maintain and operate the gas system in the most safe, reliable, and efficient way possible. These expenditures permit the Company to respond when damage occurs from weather, vehicles or dig-ins, maintain facilities, answer customer requests for locating underground pipelines, read meters, and a host of other issues that arise in this complex system, all for the purpose of keeping the natural gas safely and efficiently flowing to customers and to power plants.

As might be expected, the largest group of O&M expenditures are related to maintaining and repairing equipment. Assets are replaced because they are damaged by weather or storms, but that is only one component of the investments needed to keep the gas system operating safely, effectively, and efficiently.

Equipment wears out or quits performing as intended and must be replaced. In the natural gas realm,

equipment failures can have serious safety consequences. Adequate maintenance is critical. Equipment failure can also lead to loss of supply, leaving customers without heat and power plants without fuel to generate electricity. Leaking pipelines with a path of underground migration to structures can cause gas explosions and serious property damage or even loss of life. Maintenance of this system is even more important with older facilities, as is the case with much of Avista's system. Most of Avista's natural gas pipeline was laid in the 1950s and 1960s. The oldest pipe was installed in the 1930s.

Natural Gas Primary O&M Expenditures
2009-2019

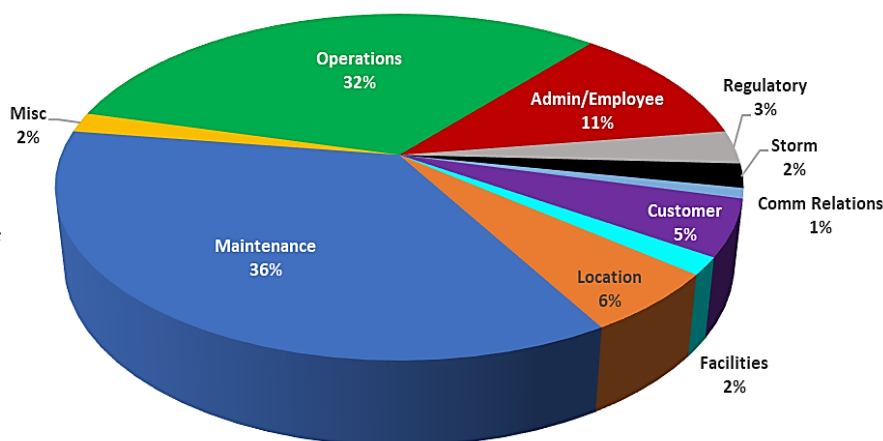


Figure 10. Historical Avista Gas Actual O&M Expenses 2009-2019



Pipeline Leak Detection

Avista performs preventative maintenance or repair of mains, regulators, meters and meter reading transmitters, regulator stations and gate stations. Maintenance work in the natural gas area also includes monitoring and adjusting pipeline pressure as needed to maintain reliability. It encompasses, cathodic protection and other infrastructure work, construction, dispatch, gas supply activities, truck and equipment expenses, and the field employees who perform the repairs and maintain the system.

Additional tasks included in the O&M category include sustaining the property related to natural gas equipment, maintaining the grounds around buildings and regulating stations, maintaining heating, cooling, and electrical systems, providing adequate security, and general supplies. Large repairs and maintenance tasks are performed by Company crews and are occasionally supplemented by contractors.

Avista's Natural Gas employee tasks are highly varied and involve everything from technical construction and maintenance activities to customer service. They perform a significant amount of regulatory-related work that necessitates a large amount of documentation required by the federal, state, local, and Commission governance over gas operations. Most importantly, their work is directly related to the safety of lives and property. Specialized training is required for these employees in order to perform their work, especially related to the protection of the public. They receive extensive education on gas system safety procedures, regulations, and legal requirements.

Avista employees are dispatched to customer homes and businesses to address safety concerns as well as being first responders to make safe and/or repair damaged or leaking gas facilities. Another operations function is leak-related work such as responding to gas odor reports, surveying the pipeline system to identify leaks, and performing the repairs needed to fix them. If anyone calls Avista to report that they smell gas, a gas serviceman is dispatched with a service order to investigate the concern. Strict standards are in place around the amount of time in which the Company must respond to these kinds of orders. If a leak is found, it is dealt with on a priority basis. The Company also responds to dig-ins related to natural gas pipelines and other damage to stations, pipelines, and equipment created by vehicles, earth movement, construction, etc.

Besides maintenance activities, customer service related expenditures are also a significant portion of gas operations. Gas employees perform customer-requested maintenance, read meters, handle general service calls, manage service turn off/on, and deal with collections when required. The gas group also manages customer concerns about equipment, even lighting pilot lights for people who need extra help. Avista's Gas employees are also very engaged in community relations and in educating the public about gas and safety.



WRAP UP

Avista takes the safety of customers and employees very seriously. The Company's Natural Gas business unit has a laser focus on this aspect of their work, and designs Capital and O&M programs that are robust, proactive, and designed to ensure that the natural gas system is as safe as it can possibly be while providing a level of service and cost effectiveness that customers and regulators expect. As depicted in this report, each of these programs has a specific goal and purpose in serving customers safely and effectively, inspecting and protecting the existing infrastructure, thoughtful, measured replacement of end-of-life assets, adding equipment to allow additional monitoring and control, providing additional service as requested, responding to location and relocation requests, and reacting to damage or repair as needed. These programs keep the Company in full regulatory compliance while balancing the need to provide service to customer even on the coldest days. The Company believes these natural gas programs have been, and will continue to be, extremely effective in providing the level of service customers request and expect.

For more information about Avista's natural gas business, the issues facing the natural gas industry, the Company's natural gas safety and public outreach programs, and a glossary of terms, please see the Avista's Natural Gas Infrastructure Plan 2019, available on the Company's internal website³⁰ or by request.

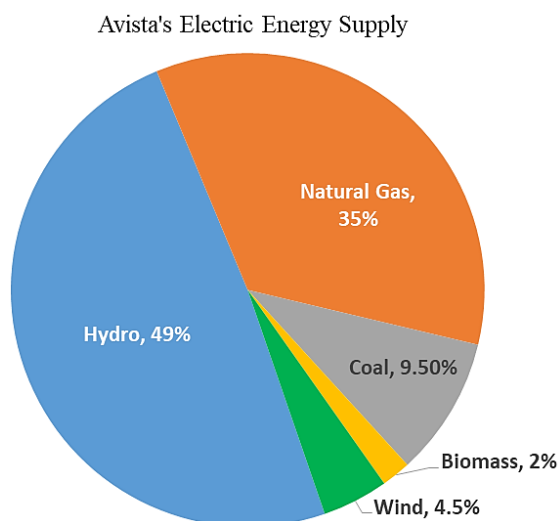


Installing natural gas pipeline across the Palouse

³⁰ Go to the Avenue, Tools and Resources tab, under "Avista Infrastructure Plans"

APPENDIX A: NATURAL GAS FOR GENERATION

Besides directly serving natural gas customers across the service territory, Avista has capitalized on the opportunity to build power generation stations that utilize this resource. Gas-fired power plants tend to be less expensive to build than a comparable coal-fired or hydroelectric plant³¹ and can be highly flexible in operations. Natural gas plants can be built for use in baseload, peaking or both, as they can be designed to come online and adjust their output quickly. Currently natural gas comprises about 35% of Avista’s electric energy supply. The Company owns five natural gas power plants capable of generating up to 547 megawatts, one of which is a baseload power plant, Coyote Springs 2. The Company also has natural gas-fired plants specifically intended for peaking or reserve capability. These facilities can be brought online and synchronized quickly to the grid, providing the capability to make up the difference between base load and peak load as needed. Their generation can be varied to meet changing load or system conditions. These plants are also used to provide operating reserve margins,³² allowing them to respond as needed to changing conditions on the grid, such as the unexpected loss of a generating unit or a transmission line. They are instrumental in integrating intermittent wind and solar facilities, as they can respond instantly to changes in the output from these resources.³³



Project Name	Fuel Type	Plant Type	Location	Start Date	Summer Maximum Capacity (MW)	Winter Maximum Capacity (MW)
<i>Rathdrum</i>	Natural Gas	Peaking	Rathdrum, ID	1995	130.0	166.5
<i>Northeast</i>	Natural Gas	Peaking	Spokane, WA	1978	42.0	61.2
<i>Boulder Park</i>	Natural Gas	Peaking	Spokane Valley, WA	2002	24.6	24.6
<i>Coyote Springs</i>	Natural Gas	Baseload	Boardman, OR	2003	286.0	287.3
<i>Kettle Falls CT</i>	Natural Gas	Peaking	Kettle Falls, WA	2002	8.0	7.5
Total					490.6	547.1

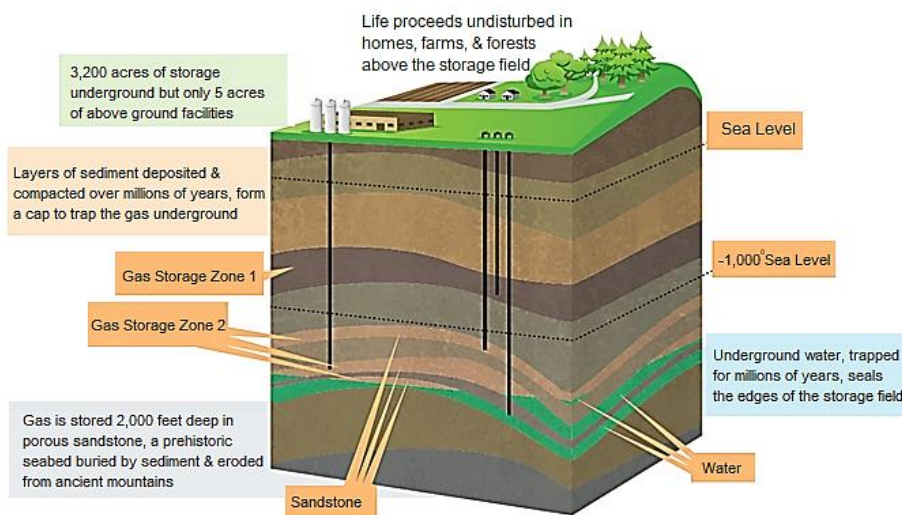
³¹ Energy Information Administration, <https://www.eia.gov/todayinenergy/detail.php?id=26532>

³² Reserve margin is extra capacity set aside (such as running a generator below its maximum potential output or keeping a unit in “ready mode” on standby) in case of unexpected outages such as when a unit goes offline unexpectedly, a transmission line fails, loads differ from what was expected, etc.

³³ For more details about Avista’s generation, please see the 2019 Generation Infrastructure Plan, available on the internal website or upon request.

APPENDIX B: JACKSON PRAIRIE STORAGE FACILITY

Avista owns 1/3 of the Jackson Prairie Storage Facility, which contains over 8.5 million dekatherms of working gas capacity. It has over 25 million cubic feet of storage capacity and is the largest natural gas storage site in the Pacific Northwest. Jackson Prairie holds 25% of the entire Northwest's peak-day supply.³⁴



Jackson Prairie consists of a series of deep underground reservoirs, basically thick porous sandstone deposits that can hold large volumes of natural gas. It has 104 wells, 45 of which are used for injection or withdrawal. Natural gas is injected into pockets up to 2,000 feet deep, where layers of sediment and sand naturally cap the deposits and keep it underground. This storage facility is a tremendous financial benefit for Avista customers. Most utility customers receive their gas supply directly from a network of interstate pipelines and local gas lines and must pay the going rate for their usage. A storage facility such as Jackson Prairie allows Avista to purchase gas at the lowest price periods (typically summertime), store it, and utilize it during the times when gas usage is peaking and prices are highest.

Jackson Prairie supplements the interstate gas pipeline supply during customer peak times and ensures that there is adequate natural gas available to serve all customers at any time of day or year. It also helps stabilize energy prices by reducing the need to purchase gas supply during high cost times, reduces dependence upon a sometimes volatile gas market, and provides reliable, cost-effective natural gas to meet customer needs. The stored gas at this facility can also be used to alleviate load imbalances on associated pipelines that sometimes occur when there is a significant difference between the gas that flows into and the gas that flows out of the pipeline. Jackson Prairie allows the Company to occasionally take advantage of market conditions to sell gas stored at Jackson Prairie at a premium and then refill it when prices are down. All of these capabilities directly benefit customers by keeping gas prices low and relatively stable as well as directly offsetting expenses via profits made in the gas marketplace.

³⁴ For more information, see "Jackson Prairie Underground Natural Gas Storage Facility" from Puget Sound Energy, https://pse.com/aboutpse/PseNewsroom/MediaKit/052_Jackson_Prairie.pdf